National Institute of Environmental Health Sciences

Macronutrient cycles and climate change: Key science areas and an international perspective

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Year: 2011
Journal: The Science of The Total Environment: [5]

Abstract:

Human activities have doubled global cycles of Nitrogen (N) and Phosphorus (P) and elevated N and P have compromised ecosystem services through the degradation of natural resources of soils, freshwaters and marine waters with a subsequent loss of biodiversity. Elevated Carbon (C) levels in the atmosphere have been linked to global warming, with positive feedback mechanisms accelerating the warming process. In order to initiate nutrient control, both national and international mitigation measures have been implemented. However, many of these initiatives focus upon a single nutrient without considering cycle interactions. A sound understanding of processes and transformations involved in the interactions of macronutrient cycles is required to avoid inadvertently enhancing effects of one nutrient, during mitigation for impacts of another. Emerging research initiatives are addressing these research gaps, with programmes in the US (USGCRP) and the UK (Macronutrient Cycles) advocating integration between scientists and stakeholders, in order to deliver results directly to policy makers. Through these programmes the scales of nitrogen and phosphorus fluxes will be quantified, and a determination made of the nature of nutrient transformations in catchments under a changing climate and perturbed carbon cycle. The consideration of connectivity between multiple macronutrient cycles will help to minimise the threats to biodiversity, ecosystem dynamics, public water supplies and human health by improved management and better focused policy.

Source: http://dx.doi.org/10.1016/j.scitotenv.2011.08.046

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Policymaker

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Quality, Other Exposure

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : United Kingdom

Health Impact: ☑

specification of health effect or disease related to climate change exposure

General Health Impact

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content